

WHAT IS CLAIMED IS:

- 1        1. A one piece anastomosis device for connecting a graft vessel to a  
2 target vessel comprising:  
3              a device body formed of a superelastic or pseudoelastic material, the  
4 body having an insertion configuration and a tissue holding configuration in which  
5 the body has an inner flange and an outer flange, wherein at least one of the inner  
6 and outer flanges is radially constrained in the insertion configuration for insertion  
7 into the target vessel and when released self deforms to the tissue holding  
8 configuration.
- 1        2. The device of Claim 1, wherein a portion of the device body  
2 between the inner flange and the outer flange is expandable from a first diameter  
3 insertion configuration to a second diameter tissue holding configuration.
- 1        3. The device of Claim 1, wherein the superelastic or pseudoelastic  
2 material is a nickel titanium alloy.
- 1        4. The device of Claim 1, further comprising a plurality of tissue  
2 penetrating elements for penetrating and holding a graft vessel in place on the  
3 device body.
- 1        5. The device of Claim 4, wherein the tissue penetrating elements are  
2 formed on one of the inner and outer flanges.
- 1        6. The device of Claim 4, wherein the tissue penetrating elements  
2 extend radially outwardly from the device body for holding an everted end of the  
3 graft vessel.

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1           7.     The device of Claim 1, wherein the device body uses the  
2 superelastic or pseudoelastic properties of the material to self deform from the  
3 insertion configuration to the tissue holding configuration.

1           8.     A tube deployed anastomosis system for connecting a graft vessel to  
2 a target vessel comprising:  
3                 a deployment tube; and  
4                 an anastomosis device formed of a superelastic or pseudoelastic  
5 material, the device having an insertion configuration and a tissue holding  
6 configuration in which the device has an inner flange and an outer flange, wherein  
7 the inner and outer flanges are radially constrained in the deployment tube in the  
8 insertion configuration for insertion into the target vessel and when released from  
9 the deployment tube, the device self deforms to the tissue holding configuration.

1           9.     The device of Claim 8, wherein a portion of the device body  
2 between the inner flange and the outer flange is expandable from a first diameter  
3 insertion configuration to a second diameter tissue holding configuration.

1           10.    The device of Claim 8, wherein the superelastic or pseudoelastic  
2 material is a nickel titanium alloy.

1           11.    The device of Claim 8, further comprising a plurality of tissue  
2 penetrating elements for penetrating and holding a graft vessel in place on the  
3 device body.

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1           12. The device of Claim 11, wherein the tissue penetrating elements  
2 extend radially outwardly from the device body for holding an everted end of the  
3 graft vessel.

1           13. The device of Claim 8, wherein the device body uses the  
2 superelastic or pseudoelastic properties of the material to self deform from the  
3 insertion configuration to the tissue holding configuration.

1           14. A method of deploying an anastomosis system for connecting a graft  
2 vessel to a target vessel, the method comprising:

3                 connecting a graft vessel to a one piece device formed of a  
4 superelastic or pseudoelastic material;

5                 poking a portion of the one piece device through the graft vessel;  
6 and

7                 deploying the one piece device by self deformation to a tissue  
8 holding configuration in which the device has an inner flange and an outer flange  
9 and traps the target vessel tissue between the inner flange and the outer flange.

1           15. The method of Claim 14, wherein the one piece device is deployed  
2 by removing a radially constraining deployment tool from the device.

1           16. The method of Claim 15, wherein the deployment tool is a  
2 deployment tube which receives the tubular device, and wherein the deployment  
3 tube is inserted partially into the target vessel wall and then withdrawn to deploy  
4 the one piece device from the deployment tube.

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1        17. The method of Claim 14, wherein the one-piece device is deployed  
2 by employing the superelastic or pseudoelastic property of a superelastic or  
3 pseudoelastic material from which the one piece device is formed.

1        18. The method of Claim 14, wherein the graft vessel is everted around  
2 the one piece device.

1        19. The method of Claim 14, wherein the deployed one piece device  
2 abuts an intima of the graft vessel against an intima of the target vessel.

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